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ABSTRACT

Some 2000 questions in education journals were analyzed for aspects of usage and content, linguistic structure, cognitive process, and logical operation. Only half of the studies examined were found to use questions, and only a third of the questions addressed teaching and learning, curriculum and milieu. The great majority of questions entailed a single variable and a dichotomous or closed structure, answerable by yes/no or a single word. Fact-stating and explaining were the most characteristic cognitive types of question, while causality was the least characteristic logical type. One-fourth of all questions were rhetorical or deliberative, lacking substance for inquiry. By contrast to theoretical and general journals, empirical journals were found to use fewer questions, addressing more technical topics, entailing an equally closed structure but more variables and causal relations. The findings are proposed to complement other kinds of knowledge about the process of scholarly inquiry. (Author)

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THE NATURE OF QUESTIONS IN EDUCATIONAL RESEARCH

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THE NATURE OF QUESTIONS IN EDUCATIONAL RESEARCH

Abstract

Some 1000 questions in education journals were analyzed for aspects of usage and content, linguistic structure, cognitive process, and logical operation. Only half of the studies examined were found to use questions, and only a third of the questions addressed teaching and learning, curriculum and milieu. The great majority of questions entailed a single variable and a dichotomous or closed structure, answerable by yes/no or a single word. Fact-stating and explaining were the most characteristic cognitive types of question, while causality was the least characteristic logical type. One fourth of all questions were rhetorical or deliberative, lacking substance for inquiry. By contrast to theoretical and general journals, empirical journals were found to use fewer questions, addressing more technical topics, entailing an equally closed structure but more variables and causal relations. The findings are proposed to complement other kinds of knowledge about the process of scholarly inquiry.

THE NATURE OF QUESTIONS IN EDUCATIONAL RESEARCH

Since the time that Socrates first exemplified their use, questions have been thought essential to the pursuit of inquiry. "The kinds of questions we ask are as many as the kinds of things we know," proposed Aristotle, "and it is in the answers to these questions that our knowledge consists" (Posterior Analytics, 89b). Indeed, the formulation of the problem has come to be regarded as more important in some respects than the method pursued and even the solution achieved (see Getzels, 1973).

Despite the acknowledged importance of questions, little enough is known of their role in scholarly inquiry. Although questions have always been of concern to philosophers especially, the systematic study of questions in relation to answers is of recent origin (for the literature on questions see Dillon, 1982a or 1982b). One of the most promising approaches to understanding the research enterprise has been to apply recent advances from linguistic and logical analyses of questions to the construction of "an interrogative theory of scientific inquiry" (Gale, 1978). A complementary approach is to investigate the pragmatics of inquiry, in search of the uses and forms of questions posed by scholars. This study undertakes to examine the nature of questions in educational research.

Problem

The general question for study runs, What is the nature of the questions posed for inquiry in the education literature? Five specific aspects of this question are:

1. use of questions - To what extent do studies in the education literature use questions as a device for inquiry?

2. content of questions - What topics do the questions address?

3. linguistic type - What is the interrogative form and structure of the questions in relation to answers?

4. cognitive type - What cognitive processes do the questions represent?

5. logical type - What logical operations do the questions entail?

All of these specifics also entail the issue of whether any aspect or category of questions (e.g., a given topic or logical type) appears to predominate or to characterize educational research, or yet to characterize research of theoretical or empirical character.

Method

The method was to examine all questions found in a sample of nine journals representing theoretical, empirical, and general literature, and to rate their use, content, and linguistic, cognitive, and logical type.

Journals

Three journals were selected in each category of literature, on the principle that the journal be representative of the broad field rather than devoted to a particular discipline, subject-matter, or type of education. (That is to exclude journals in, for example, the psychology of education, reading or science, and special education.) Journals in the theoretical and empirical categories publish predominantly theoretical or empirical studies and have as primary audience scholarly researchers; journals in the general category publish a mix of theoretical, empirical, and "practical" studies (e.g., pedagogical), together with various articles of commentary, and are addressed to professionals throughout the field. A fourth category, pedagogical journals (e.g., Instructor) was not included in this study. The contents of one volume/year of each journal was examined, as follows:

- theoretical: Educational Studies (v. 8, 1977-78); Educational Theory (v. 27, 1977); Journal of Educational Thought (v. 10, 1976).

- empirical: American Educational Research Journal (v. 60, 1979); Journal of Educational Research (v. 70, 1976); Journal of Experimental Education (v. 45, 1976-77).

- general: Clearing House (v. 51, 1977-78); Education, (1975-76, v. 95, #4 & v. 96, #1-3); Phi Delta Kappan (1979, v. 60, #5-7 & v. 61, #1-4).

Use of questions

All questions, including indirect questions, found in the articles were copied out by the investigator. Articles without questions were noted, as was the place of the question in an article, such as at its start or end (see list in Table 1 at end of text).

Content of questions

To analyze question content, eight categories were empirically derived from inspecting the topics of the questions themselves. The categories include four commonplace topics of teaching, learning, curriculum, and milieu, together with philosophical-historical and socio-political issues, measurement and evaluation, and the education profession. Table 2a at the end of text defines these categories and gives examples of each taken from the various journals examined. Two graduate assistants independently sorted the questions, with 97.4% agreement. Where the investigator disagreed, his codings constituted the data for this study.

Apart from topic, questions also contain a number of variables. A question may ask about a single variable P or about P and Q, R, etc. "Will reducing class size lead to greater student learning?" is rendered as the two-variable question, $?(P \rightarrow Q)$. A blank variable X is contained in questions such as "What are the consequences of reducing class size?", rendered as: $?(P \rightarrow X)$. The number of variables was determined by rendering the question into elementary symbolic logic and merely counting the Ps and Qs.

Linguistic type

The linguistic type of question consists of its interrogative form and structure. Form was rated as inverted subject-predicate, P or Q alternative, and the various interrogative wh-words (all listed in Table 3).

Structure was coded according to the constraint which the syntax of the question places on the linguistic sufficiency of response. No inference was made respecting the intents or expectations of the questioner (e.g., for an expansive response), but only the minimum extent of response permitted or required by the syntactic structure of the question. Structure may permit two types of response, (1) a yes/no or (2) a single word or phrase; and it may require a third type, (3) several phrases or a sentence. Categories (1-2) represent closed structure, and (3) open. A research assistant and the investigator independently coded a sample of questions, with 93.5% agreement. The investigator's codings constitute the data for this study.

Cognitive type

The cognitive process represented by the question was coded according to six categories borrowed from Bellack, Kliebard, Hyman, and Smith (1966): defining, interpreting, fact-stating, explaining, opining, and justifying. Table 4a defines these categories and gives examples of each from the journals examined. Two graduate assistants who had experience applying these categories in a study concurrent with the present one independently coded the questions, reaching virtually 100% agreement.

Logical type

The logical operation entailed in the question was analyzed by means of a scheme constructed for this study and revised in the course of examining the questions. The inspiration of this scheme is found in Book II of Aristotle's Posterior Analytics and in the model developed by Lundstedt (1968). Table 5a presents the scheme in convenient summary form, and Table 5b gives descriptions of each category and examples taken from the journals. (For a detailed presentation of the scheme see Dillon, 1982c.) The scheme comprises 13 categories (plus subcategories and extra-categories) grouped by order of information.

First-order questions entail properties of some variable P. There are six categories: affirmation/negation, identification, description, definition, application, and explication.

Second-order questions entail comparisons of P and Q, with three categories: conjunction/disjunction, equivalence, and difference (disproportion and subordination).

Third-order questions entail (contingent) relations between P and Q, with four categories: relation, correlation, conditionality (consequence and antecedence), and causality or biconditionality.

Remaining types of questions fall into a zero-order of information, since no knowledge is entailed in answer. Rhetorical questions seek no knowledge in answer; deliberative questions seek decisions and actions rather than knowledge; and partial questions are unclear as to what knowledge, if any, they seek in answer.

Two graduate assistants and the investigator independently coded a sample of the questions, and the investigator clarified the scheme. All three then independently coded all of the questions while the scheme was further clarified. The two assistants subsequently conferred and agreed upon a common coding (treated as rater #1). They and the investigator (rater #2) agreed in 85.9% of the cases. The investigator's codings constitute the data for this study.

Analysis

Analysis proceeded by computing frequency distributions and percentages of questions in various categories of use, content, linguistic, cognitive, and logical type, both for the journals all together and by type of journal.

The sample consists of 924 questions found in (some of) 520 studies published in 9 journals of 3 types, theoretical, empirical, and general.

Results

What is the nature of questions in educational research? Five tables at end of text report detailed results for each of five aspects of this question: the use of questions (Table 1), the content of the questions (Tables 2b and 2c), their linguistic type (Table 3), cognitive type (Table 4b), and logical type (Table 5c). Findings for each will be summarized in turn, first for the overall literature and then for different types of journals.

Overall literature

To what extent do studies in the education literature use questions as a device for inquiry? (Table 1). Only half of the 520 studies examined in the nine journals used questions. Those which did posed about four questions each. The questions do not characteristically appear in any particular portion of the article but may be found throughout the beginning, middle, and ending sections.

What topics do the questions bear on? (Table 2b). No one of eight general topics predominates in the content of these questions. Learning and teaching are the very least prominent topics; when joined with curriculum and milieu, the four "commonplaces" together account for only one-third of all the questions. Apart from topic, questions also contain variables, asking about some one variable P, two variables P and Q, and so forth. How many variables are in question? (Table 2c). The great majority of these questions (76%) ask about a single variable. Only 22 of the 924 questions were found to contain three variables, and only 3 contain four variables.

As for linguistic type (Table 3), the characteristic form of the questions is polar (41%), giving them a closed structure in relation to the answer; the majority of the questions (54%) can be answered by a yes/no or by a single word. An interesting relation can be seen between form and structure, for the choice of form may constrain the extent of answer. The typical inverted form of the questions (Is P?) sets forth a proposition to be affirmed or denied in a yes/no answer. Of the wh-forms of question, who, when, where and how-degree tend to take a single-word response (e.g., 94% of who-questions); and what, why, and how-manner take several phrases or a sentence in response (e.g., 86% of what-questions). Unexpectedly few why-questions (8%) appear in this literature.

What kind of knowledge do the questions represent? Knowledge may be characterized by the questioner's inferred cognitive process or by the question's observed logical operation. Of six types of cognitive process (Table 4b), fact-stating and explaining were represented by the great majority of the questions (76%). As for logical type (Table 5c), no one of the thirteen predominates. Less than 1% of the questions entail any one of these types: affirmation/negation, conjunction/disjunction, equivalence, correlation, and causality. The very least type of all is causality, of which only 3 questions were found. Even adding to this type the conditional questions yields an unexpectedly small proportion of questions (11%) which may be said to entail causal relations.

Although no one logical type is predominant, there seem to be characteristic groupings by the order of information which the types represent. Half of the questions entail first-order knowledge of the properties of some variable P, by contrast to only 19% which entail second- and third-order knowledge of comparisons and relations between P and Q. The remaining 27% of the questions do not entail knowledge in answer: rhetorical questions seek no knowledge in answer; deliberative questions seek decisions or actions rather than knowledge; and partial questions are unclear as to what knowledge, if any, is sought. All of these may be considered to fall into the zero-order of information. That is, one-fourth of the questions in this literature lack substance for inquiry.

Types of journals

Theoretical and empirical journals in particular were found to differ in their use of questions and in the kinds of questions which they pose. General journals differ in some respects, while in others, true to their type, they are situated between the theoretical and empirical.

Of the three types of literature, empirical studies use questions the least and theoretical studies the most (Table 1). The empirical literature contains the fewest studies with questions (about one-third of the total) and the fewest questions per study (two); the theoretical literature contains twice the studies with questions (about three-fourths) and three times the questions per study (six). Midway between these types are the general journals with about half of the

studies using questions, four per study. At the extremes, 80% of the studies in Educational Theory pose questions, nearly 9 per study; in Journal of Experimental Education, 20% of the studies and 1-2 questions each.

Another aspect of usage is the salience of questions, indicated by their place in the article. Questions tend to appear in the beginning and ending paragraphs of empirical reports--20% in the first and last sentence alone--but in the middle of theoretical (and general) articles (Table 1). This distribution suggests that empirical reports might raise one question for study at the start and then a second at the end, for further research; whereas theoretical articles might begin with a disquisition, about which several questions are later posed and then resolved in the main portion of the narrative, leaving no question hanging at the end. Nonetheless, the great majority of empirical studies do not use questions at all and the remainder use only one or two, while the great majority of theoretical studies use a half dozen questions.

The content of questions in empirical and theoretical studies also differs, not always in expected ways (Table 2b). For example, teaching and learning account for three times the empirical questions as the theoretical. Other differences seem more expected. The most characteristic empirical question bears on measurement and evaluation (40%) and none bears on philosophical-historical issues; whereas these issues are most characteristic of theoretical questions (35%), scarcely any of which bear on measurement and evaluation.

Nonetheless, neither type of literature characteristically poses questions about the commonplace topics of teaching and learning, curriculum and milieu but rather about specialized matters, whether philosophical or statistical (or socio-political in the general journals).

In addressing all topics, theoretical and general studies both overwhelmingly (86% and 80%) inquire about a single variable (Table 2c). Empirical studies pose a like proportion of two-variable questions (46%) as of one-variable questions (41%). For example, 88% of the questions in Journal of Educational Thought and 83% in Education entail a single variable, whereas 80% in Journal of Experimental Education entail two or more variables. Of all journals, only the empirical tend to ask questions about three or four variables, though few enough of this type (12%); and only one journal, Journal of Experimental Education, asks four-variable questions, though only three in all.

The journals do not differ in the linguistic form or structure of their questions (Table 3). For example, 50% of the questions in both Journal of Educational Thought and Journal of Educational Research are yes/no questions. Compared with empirical journals, slightly more of the questions in theoretical and general journals require phrases or a sentence in answer. On the whole, however, the differences seem less notable than the similarities, for the majority of questions in all journals are polar in form and closed in structure, characteristically answered by yes/no or a single word.

The journals differ somewhat in the cognitive process which their questions represent, but the great majority of questions in all journals represent fact-stating and explaining (Table 4b). These two types are merely less marked in the theoretical journals (67%) than in the empirical (89%)--with general journals between (79%)--since theoretical journals have a greater proportion of defining and opining questions (27%) than do the empirical journals (10%). However, these differences appear less notable than the similarities.

An intriguing finding emerges from examining the cognitive type of question by its place in the article. It appears as though questions of one type may predominate at the beginning of a study and another type at the end. For example, in the theoretical journals the proportion of questions of defining type steadily decreases by halves from start through middle to end of article (from 17% to 8% to 3%), while opining questions correspondingly increase by halves (from 9% to 18% to 32%). This finding holds for all journals: twice as many defining questions appear at the start of articles as at the end (5% vs. 2%), and twice as many opining questions at the end as at the start (25% vs. 11%). A similar progression can be seen by combining the six cognitive types into lower-cognitive (1-3) and higher (4-6). The proportion of lower-type questions in all journals steadily decreases from start to end of article while higher-types steadily increase, with the result that in the last paragraphs one-third of the questions are of the lower type and two-thirds are of the higher. Perhaps a standard progression, whether in theoretical or in empirical research,

is first to raise questions about definitions or facts, and then about opinions or explanations pertaining to these. That indeed is just the progression which Aristotle first noted: when we have ascertained the fact we proceed to inquire into the reason (Posterior Analytics, 89b).

To what extent are different logical operations entailed in the questions posed by different journals? (Table 5c) Some differences may be noted with the caution that no one logical category was found to predominate either overall or by journal type. The most common kind of question--still only one-fourth of the total in each case--in theoretical journals is definition; in empirical journals, conditionality; and, in general journals, application. (Another one-fourth of the questions in general journals are rhetorical.) Among the least common kinds of question--about 5% in each case--are conditionality in the theoretical journals, definition in the empirical, and both definition and conditionality in the general journals.

As noted, few of the questions entail causal relations, whether conditional or biconditional. Comparatively more of the empirical questions (30%) bear on causal relations than do questions in theoretical (5%) and general (10%) journals--representing frequencies of 38, 16, and 50 questions respectively. There seems little accounting for this circumstance. No particular reason comes to mind that any one of these journals should not inquire into causal relations, nor one journal any more or less so than another.

When logical types are grouped according to the order of information which they entail, both the general and especially theoretical

journals are seen to inquire into first-order properties, while empirical journals inquire into third-order relations. Nonetheless, properties are entailed in at least half of the questions in each type of journal, and relations account for only 39% of questions in empirical journals. One-fourth of the questions in general journals are of the zero-order of information; one article in Phi Delta Kappan poses 20 rhetorical questions in a row.

As for the relation between logical type and place of question, one suggestive finding can be noted. Compared with questions at the start of articles, more of those at the end are deliberative (2% vs. 11%). Half of all deliberative questions appear at the end of an article. Perhaps the end is a more suitable place for deliberative reflection on the previous discusion ("Now, what are we going to do about it?"). Empirical studies, however, neither start nor finish with such questions, for they raise no deliberative questions at all.

Discussion

The findings from this study provide one kind of knowledge about one part of the pragmatics of inquiry in education. Within their limits the findings serve as a useful complement to prescriptions of criteria for research questions and to descriptions of the types of questions which might be asked.

Criteria of questions

In discussing the formulation of research problems, authors of texts on research method commonly propose that the problem be expressed in interrogative form and that the question entail a relationship between two or more variables. Kerlinger (1979) specifies these as "criteria of good research problems" (p. 32):

> First, the problem should express a relationship between two or more variables. Second, the problem should be stated in question form.

These same points are re-iterated by a number of other authors (Ary, Jacobs, & Razavieh, 1979, p. 51; Hopkins, 1980, p. 123; Steiner, 1978, p. 14; Tuckman, 1978, p. 21).

Whatever may be the merit of these criteria, they are not met by the majority of studies examined. This study has found that:

(1) only half of the studies in all journals, and one-third of those in empirical journals, use questions;

(2) less than one-quarter of all the questions, and only 59% of those in empirical journals, contain two or more variables;

(3) only half of all the questions, including half of the

empirical, entail relations (whether comparative or contingent).

A third criterion relating to the formulation of the question holds that it be of the "open" type. For example (Hopkins, 1980, p. 124):

> A good research question cannot be answered yes or no. Answers to good research questions are not dichotomous.

This study found that 40% of the questions in the literature, including 40% in the empirical literature, are dichotomous and can be answered by yes or no.

The findings from this study do not relate to other criteria commonly proposed for the formulation of the question (e.g., that it be clearly, simply, and concisely phrased), nor to the criteria for the significance of the answer (e.g., contribution to knowledge, stimulation of further research). Still other kinds of criteria can be invoked respecting the validity of the question in relation to the answer (e.g., Emmet, 1968; Fischer, 1970) and the genuineness of the questioning act in relation to the inquirer (e.g., Clark, 1972; Knight, 1967). These latter criteria are not drawn from the methodological literature in education.

It should be noted that the criteria reviewed here are proposed primarily for so-called quantitative empirical research in education, of which the experiment is commonly regarded as the archetype. On that point it should go without saying that research also comprises other styles and methods. These are entailed by the variety of questions which in fact arise, are posed and pursued.

One of the problems for understanding scholarly inquiry is presented by the contrast between on the one hand the proscription of certain classes or forms of question or yet the restricted recognition of specified kinds, and on the other the pragmatics of the enterprise: the perplexities which actually stimulate inquiry and the varieties of questions which actually formulate them for its pursuit. As Gale (1978) has remarked of the methodology of science, the major conceptualizations are limited by "a failure to consider a more general conception of an interrogative theory of science" and "only cover a small fragment of the kinds of questions raised and types of answers desired in scientific contexts" (p. 329).

Not all questions are valid, that is, answerable whether in principle or in fact. But of those which are, many more kinds than are commonly recognized appear to be formulated and pursued--and published--by those who inquire in various ways into various facets of education. Comprehending this variety remains an empirical as well as a conceptual task for the understanding of scholarly inquiry in education no less than in other fields.

Types of questions

Other views are not prescriptive or proscriptive but rather descriptive of the types of questions which might be used for research. Two recent proposals are notable for the variety of types which they include, yet also for the failure of these types to describe the variety of questions posed in the literature examined here.

As part of an interesting survey of disciplines in education, Shulman (1981) illustrates six questions which can be raised for research into the topic of reading (each question entailing a different method and/or discipline). For example, "What makes some people successful readers and others unsuccessful?" is said to entail the use of correlational methods from disciplines such as psychology (pp. 6-7). The six examples given can be seen to fit within four categories from this study: description, definition, application, and conditionality. Together these four categories were found to account for only half of all the questions in the journals examined: half of those in both the theoretical and general journals, and two-thirds of those in the empirical. These findings may suggest ways to elaborate the variety of questions which may be used for research, accounting for the remaining half of the questions which are actually being used. What types (other than the rhetorical) might these questions represent? What methods of inquiry do they entail? What kinds of knowledge are they providing?

Another description of research questions has been offered by Smith (1981) in a stimulating note on "noncausal inquiry in education." He proposes that a wide variety of noncausal questions be posed by educational researchers, in addition to causal ones. "Only causal questions tend to be asked," Smith asserts, "to the exclusion of all other types of questions" (p. 23). Like Shulman, he then lists nine examples of questions (together with appropriate methods and disciplines) that can be asked about a reading program, and he encourages researchers to pose the eight noncausal types. The findings from

this study bear both on the types that are proposed and on the assertion respecting their use in the literature.

The eight noncausal questions given can be seen to fit within five categories from this study: description, definition, application, explication, and equivalence. Together these have been found to account for half of the questions in the literature examined, including half of those in empirical journals. As for the causal type, the categories of conditionality and causality together account for 11% of all the questions and 30% of those in empirical journals; the remaining 90% and 70% are noncausal. That is, the specified types of questions which are recommended for use are already being used in half of the cases examined, while that type which is asserted to be used predominantly if not exclusively is being used in less than a third of the cases.

As with the previous illustration, these findings suggest ways to specify further types of questions for research, accounting for the significant proportion of questions actually being used in the literature but not provided for by the suggested categories. In this case, moreover, the findings provide a basis for factual propositions about the use of questions and the nature of questions in the education literature. In that respect the findings from this study may yield fruitful implications for both conceptual and empirical knowledge of the enterprise of inquiry in education.

Limitations

Nonetheless, these findings serve only within limits. Particularly for the logical types of question, the analytic categories used in this study remain to be elaborated, revised, and tested further against theoretical constructs in erotetic logic and against actual characteristics of the questions found in the literature.

The sample of nine journals examined in this study also constrains the findings, if for no other reason than that they represent a minuscule proportion of the 170 indexed in SSCI or the 780 in CIJE. The choice of journals to represent the general category, and the exclusion of a pedagogical category, limits comparisons and generalizations. Comparisons are further limited by the disproportion in numbers of studies in the theoretical journals (59) by contrast with the empirical (148) and general (313), resulting in part from the varying length of articles and the differing number of issues published in a year's volume.

Finally, as the findings themselves reveal in an obverse way, half of the problems for research are not formulated as questions. Indeed, a good number of studies appear to leave the problem altogether unformulated--whether as question or statement, hypothesis or conflict, etc.--but merely announce a topic or purpose for the study. Although that in itself constitutes a major finding, it serves to remind that this study set out to describe the kinds of questions posed and not the kinds of all problems posed or the nature of all topics addressed in the literature.

Conclusion

This study provides some knowledge of the nature of questions posed for inquiry in education, as revealed by selected journals of theoretical, empirical, and general character. A followup study examines the questions posed in disciplines of inquiry within education, as revealed by selected journals of psychology, philosophy, history, and sociology. These investigations propose to complement theoretical constructions of the process of scientific inquiry. From this combined knowledge there may result a contribution not only to enhanced understanding but also to informed practice of inquiry. For, as Socrates first exemplified and as Aristotle first taught, it is in questions and their answers that our knowledge consists.

References

Ary, D., Jacobs, L. C., & Razavieh, A. Introduction to research in education. New York: Holt, Rinehart & Winston, 1979.

Bellack, A. A., Kliebard, H. M., Hyman, R. T., & Smith, F. L. The language of the classroom. New York: Teachers College, 1966.

Clark, M. Perplexity and knowledge: An inquiry into the structures of questioning. The Hague: Nijhoff, 1972.

Dillon, J. T. The multidisciplinary study of questioning. Journal of Educational Psychology, 1982, 74, 147-165.

Dillon, J. T. Categories of literature on questioning in various enterprises: An introduction and bibliography. Language Sciences, 1982. (b)

Dillon, J. T. A classification of research questions. Unpublished manuscript, School of Education, University of California, 1982. (c)

Emmet, E. R. Learning to philosophize (rev. ed.). Harmondsworth, England: Penguin, 1968. Chap. 4, Asking the right questions.

Fischer, D. H. Historians' fallacies: Toward a logic of historical thought. New York: Harper & Row, 1970. Chap. 1, Fallacies of question-framing.

Gale, S. A prolegomenon to an interrogative theory of scientific inquiry. In H. Hiz (Ed.), Questions. Dordrecht, Holland: Reidel, 1978.

Getzels, J. W. Problem finding. University of Chicago Record, 1973, 7(9), 281-283.

Hopkins, C. R. Understanding educational research. Columbus, OH: Merrill, 1980.

Kerlinger, F. N. Behavioral research: A conceptual approach. New York: Holt, Rinehart & Winston, 1979.

Lundstedt, S. A note on asking questions. Journal of General Psychology, 1968, 79, 229-239.

Shulman, L. S. Disciplines of inquiry in education: An overview. Educational Researcher, 1981, 10(6), 5-12.

Smith, N. L. Noncausal inquiry in education. Educational Researcher, 1981, 10(3), 23.

Steiner, E. Logical and conceptual analytic techniques for educational researchers. Washington, D.C.: University Press of America, 1978.

Tuckman, B. W. Conducting educational research (2nd ed.). New York: Harcourt, 1978.

Table 1

Use of Questions

Use Category	Journal Type			
	Theoretical	Empirical	General	All Journals
FREQUENCY OF QUESTIONS				
N of studies	59	148	313	520
% with questions	78	36	44	46
N of questions	300	126	498	924
Mean questions (per study with questions)	6.5	2.3	3.6	3.9
PLACE OF QUESTIONS				
1. Title of article	1%	1%	4%	2%
2. First sentence	1	11	4	3
3. Start paragraphs	12	43	25	24
4. Middle	74	21	56	57
5. End paragraphs	7	17	10	10
6. Last sentence	5	8	2	4
	100%	100%	100%	100%

Table 2a

Content of Questions

CATEGORY & DESCRIPTION	EXAMPLES (from each journal type)
1. TEACHER INSTRUCTION - teaching strategies & practices, problems of method, motivational techniques, effective communication.	T - How does one teach self-motivation? (ET, 15) E - Can learning be facilitated by combining various aspects of traditional methods with personalized instruction? (JEE, 4) G - What teaching methodology does this definition of writing imply? (PDK, 318)
2. STUDENT LEARNING - nature of learning, concept formation, acquisition of knowledge & understanding, effects of student aptitude.	T - Is the learning acquired in one of these major areas useful in studying the other area? (ET, 51) E - Does response to treatment depend on individual student aptitude? (AERJ, 43) G - What are the major needs of young learners? (ED, 73)
3. CURRICULUM CONTENT - appropriateness of various subjects, their proper nature, course selection & requirements, programs.	T - What makes one subject proper and another improper? (ET, 33) E - Can worthy children's books increase sensitivity towards people? (JER, 64) G - Is the electives curriculum model obsolete? (CH, 5)
4. LEARNING ENVIRONMENT - effects on the teaching/learning process of school expectations & atmosphere, class size & interaction	T - Should the relationship between teacher and pupil be one of this sense of sympathy? (ET, 177) E - Is the stability of classroom variables related to the type of structure of the classroom? (JER, 61) G - Is a given student likely to learn more in an ability-grouped system than in a heterogeneously grouped system? (CH, 15)
5. PHILOSOPHICAL-HISTORICAL ISSUES - assumptions & postulates of truth, reality, value & goodness; formulation of educational goals; development of educational thought.	T - What is education for justice? (ES, 11) E - (no instance) G - What objectives have priorities over others? (CH, 98)
6. SOCIO-POLITICAL ISSUES - impact upon education of modes of governance & finance; legislative & judicial interventions; ethnicity, sex-role expectations, individual vs. collective rights.	T - Who whould pay for higher education? (ES, 24) E - What types of women defy strong sex-role stereotypes by entering male-dominated fields? (AERJ, 28) G - Do schools get better or worse as state and federal regulation increases? (PDK, 147)

Table 2a (cont.)

CATEGORY & DESCRIPTION	EXAMPLES (from each journal type)
7. MEASUREMENT & EVALUATION - methodological issues in research & statistics; testing & ratings; evaluation and grades; various assessment techniques & devices.	T - Are the categories in a behavior rating system independent or correlated? (JET, 2) E - Do student and self-ratings of instructor skill and student-directed behavior demonstrate convergent and discriminant validity? (AERJ, 34) G - How are attitudes measured? (ED, 3)
8. EDUCATION PROFESSION - aspects of the profession such as its organization, training, and personnel.	T - How does this disparity of themes affect administration? (ET, 131) E - Were these student teachers jeopardized in terms of their own future flexibility by being exposed to a single-program model as opposed to receiving equal exposure to all four models? (JER, 2) G - Is there a logical basis for merit pay? (PDK, 119)
9. MISCELLANY - topics not clearly fitting into other categories, and questions whose topic is unclear.	T - What, then, has been said of Ludwig Wittgenstein? (ES, 3) E - How does one explain such aggregate birth-order effects as do exist? (AERJ, 23) G - What foods and substances influence behavior? (PDK, 194)

Table 2b

Content of Questions

Content Category	Journal Type: Theoretical (n=300)	Empirical (n=126)	General (n=498)	All Journals (N=924 qq.)
1. Teacher instruction	8.0%	16.7%	6.0%	8.1%
2. Student learning	5.7	19.8	3.0	6.2
3. Curriculum content	11.7	2.4	14.7	12.0
4. Learning environment	4.0	9.5	8.4	7.1
5. Philosophical-historical issues	34.7	--	9.8	16.6
6. Socio-political issues	20.0	8.7	22.5	19.8
7. Measurement & evaluation	2.0	39.7	9.0	10.9
8. Education profession	4.0	1.6	14.9	9.5
9. Miscellany	10.0	1.6	11.6	9.7
	100%	100%	100%	100%

Table 2c

Variables in Question

Number of Variables	Journal			
	Theoretical (n=300)	Empirical (n=126)	General (n=498)	All Journals (N=924 qq.)
One	86.0%	41.3%	79.5%	76.4%
Two	12.3	46.0	19.7	20.9
Three	1.7	10.3	0.8	2.4
Four	--	2.4	--	0.3
	100%	100%	100%	100%

Table 3

Linguistic Type of Questions

Linguistic Category	Journal Type			
	Theoretical (n=300)	Empirical (n=126)	General (n=498)	All Journals (N=924 qq.)
INTERROGATIVE FORM				
1. Inversion (is P, does P, etc.)	33%	37%	35%	34%
2. Alternative (P or Q)	4	8	3	4
3. Whether (P or not)	4	4	<1	2
4. Who	4	--	4	4
5. What	31	19	28	28
6. When	<1	3	<1	<1
7. Where	1	--	1	<1
8. Why	6	6	10	8
9. How-manner	14	12	12	13
10. How-degree	2	11	6	5
All Forms	100%	100%	100%	100%
INTERROGATIVE STRUCTURE				
1. Yes/No response	41	49	38	40
2. One-word response	13	17	21	18
3. Sentence response	46	34	41	42
All structures	100%	100%	100%	100%

Table 4a.

Cognitive Type of Questions

CATEGORY & DESCRIPTION *	EXAMPLES (from each journal type)
1. DEFINING - characteristics of a class or term; examples of term; object referent of term	T - What is education for justice?(ES, 11) E - What types of women defy strong sex-role stereotypes by entering male-dominated fields? (AERJ, 28) G - What is population education? (CH, 83)
2. INTERPRETING - verbal equivalent of a statement, slogan, aphorism or proverb	T - What did Dewey mean when he used the term "free & democratic life"? (ET, 6) E - How is this outcome to be interpreted? (JEE, 6) G - What do the grades mean? (CH, 64)
3. FACT-STATING - what is, was, or will be without explanation or evaluation; account, report, description, statement of event or state of affairs.	T - Are pupils learning cognitive skills? (JET, 26) E - What are the major instructional objectives of teachers? (AERJ, 35) G - What are American students learning? (PDK, 285)
4. EXPLAINING - relation between objects, events, principles; conditional inference; cause-effect; explicit comparison-contrast; statement of principles, theories, or laws.	T - Are the parts of social studies loosely or closely related?(ET, 45) E - Why does the phenomenon of sex differences in career choice persist? G - What feedback strategies will be the most effective? (CH, 12)
5. OPINING - personal values for statement of policy,judgment, or evaluation of event, idea, state of affairs; direct & indirect evaluation.	T - Should the teacher-pupil relationship be love in this sense? (ET, 175) E - Should one attempt to help the victim by teaching him or her to be more aggressive or to be more socially acceptable? (JER, 39) G - Does public education have the responbility for providing career education? (ED, 29)
6. JUSTIFYING - reasons or arguments for or against opinion or judgment	T - Why should we accept this claim? (JET, 7) E - (no instance) G - Why should the schools add more to the flood of art? (PDK, 16)

*from Bellack et al., 1966.

Table 4b

Cognitive Type of Questions

Cognitive Category *	Journal Type			
	Theoretical (n=300)	Empirical (n=126)	General (n=498)	All Journals (N=924 qq.)
1. DEFINING	8.7	1.6	1.6	3.9
2. INTERPRETING	3.3	1.6	1.6	2.2
3. FACT-STATING	30.7	39.7	47.6	41.0
4. EXPLAINING	36.0	49.2	31.3	35.3
5. OPINING	18.3	7.9	17.1	16.2
6. JUSTIFYING	3.0	---	0.8	1.4
	100%	100%	100%	100%

*from Bellack et al. (1966)

Table 5a

(Revised 1/82) LOGICAL TYPES OF RESEARCH QUESTIONS J.T. Dillon

Order of Information	Notation	Question Type	Knowledge in Answer to Question
Zero-order	?!(P)	0. RHETORICAL	- none
First-order: PROPERTIES OF P	?(P) ?(-P)	1. AFFIRMATION-NEGATION	- to know whether P is.
	?(P_i)	2. IDENTIFICATION	- to know whether this is a P.
	?(P_d)	3. DESCRIPTION	- to know the qualities of P.
	?(P=)	4. DEFINITION	- to know what P is.
	?(P→)	5. APPLICATION	- to know what P does or can do.
	?(P_x)	6. EXPLICATION	- to know why P has or not a given property.
Second-order: COMPARISONS OF P AND Q	?(P & Q) ?(P v Q)	7. CONJUNCTION-DISJUNCTION	- to know whether P and Q are concomitants, (or) whether P and Q are alternatives.
	?(P = Q)	8. EQUIVALENCE	- to know whether P is like Q.
	?(P vs. Q)	9. DIFFERENCE	- to know in what way P is unlike Q.
	?(P > Q)	9a. DISPROPORTION	- to know whether P is greater than Q.
	?(P : Q)	9b. SUBORDINATION	- to know whether P is superordinate to Q.
Third-order: CONTINGENT RELATIONS OF P AND Q	?(P-Q)	10. RELATION	- to know whether P relates to Q.
	?(P, Q)	11. CORRELATION	- to know whether P and Q covary.
	?(P→ Q)	12. CONDITIONALITY	- to know whether P is a condition of Q.
	?(P→ X)	12a. CONSEQUENCE	- to know the consequent of P.
	?(X→ P)	12b. ANTECEDENCE	- to know the antecedent of P.
	?(P↔Q)	13. CAUSALITY (BI-CONDITIONAL)	- to know whether P is the cause of Q. (If P, then Q and if Q, then P.)
Unclear	(?)	14. OTHER	- to know P in other ways, unclear

Table 5b

Logical Type of Questions: Examples

CATEGORY & DESCRIPTION	EXAMPLES (from each journal type)
1. AFFIRMATION-NEGATION - to know whether P is. Existence, reality, facticity, existential truth & possibility.	T - Is there a generalizing science that does now, or logically could in the future, fully explain human behavior? (ET, 82) E - (none) G - Learning and memory improvement through chemistry: dream or reality in the offing? (PDK, 306)
2. IDENTIFICATION - to know whether this is a P. Instance, example, illustration, the who-or-what agent.	T - Who does this assigning of social roles? (ES, 49) E - (none) G - What major adolescent career lines or types exist within a specific educational institution? (ED, 58)
3. DESCRIPTION - to know the qualities of P. Characteristics, traits, features, virtues; form, quantity, extent, intensity, duration; worth, validity, necessity.	T - The question then arises as to whether or not the measuring device possesses ipsative or differential properties. (JET, 3) E - Is the relationship linear or non-linear? (AERJ, 11) G - How many alcoholic educators are there? (PDK, 122)
4. DEFINITION - to know what P is. (a) nature, essence, criteria (b) label, term & proper usage (c) meaning, interpretation	T - What is a school? (JET, 15) E - What do we mean by cognitive style? (JER, 47) G - Can either of these two definitions be used to describe population education programs in high schools today? (CH, 84)
5. APPLICATION - to know what P does or can do. (a) workings, operation, performance, activity (b) uses, utilization, function, role, purpose, accomplishments (c) methods, means, how done, achieved.	T - How might the model be used in the classroom to promote wholistic intelligence (ET, 54) E - Can cognitive preference tests be used for admission and counseling purposes? (JER, 49) G - How are attitudes measured? (ED, 3) - What can teachers do to achieve these objectives? (CH, 38)

Table 5b (cont.)

6. EXPLICATION - to know why P has or not a given property Account, justification, motive, process, non-causal explanation.	T - Why is it that some works of art only entertain us, but others "teach" us? (ET, 157) E - A question which arises is why games are intrinsically motivating. (JEE, 7) G - What went wrong with Boston desegregation? (CH, 40)
7. CONJUNCTION-DISJUNCTION - to know whether P and Q are concomitants (or) whether P and Q are alternatives. (a) go, belong together; association, simultaneity, complementarity. (b) exclusion, separation, polarity, contradiction.	T - The question might be raised as to whether the two emphases can be separated in this manner. (ET, 165b) E - What teacher behaviors accompany disruptive transitions from one activity to another? (AERJ, 9) G - Are equality and excellence mutually exclusive or inclusive? (PDK, 197)
8. EQUIVALENCE - to know whether P is like Q. Identity, sameness; similarity, resemblance, commonality; analogy & substitution.	T - What do the following have in common: (etc.)? (ET, 23) E- Are there underlying factors in our two typologies that resemble those postulated by Clark & Trow? (AERJ, 16) G - How does this arrangement square with democratic theory? (CH, 27)
9. DIFFERENCE - to know in what way P is unlike Q. 9a. DISPROPORTION - to know whether P is greater than Q. More/less in any respect, degree, quantity, etc. 9b. SUBORDINATION - to know whether P is superordinate to Q. Superiority, priority, precedence; part-whole, element/class/category of.	T - What, then, does a concert offer that Musak does not? (ET, 159) E - (none) G - Do alternative school students have higher career aspirations than traditional school students? (ED, 27) T - Which predominates? option rights or welfare rights? (ET, 89) E - The question still remains as to where is the student in relation to self and the group? (JER, 9) G - What objectives have priorities over others? (CH, 98)

Table 5b (cont.)

10. RELATION - to know whether P relates to Q. General, unspecified relationship.	T - Are the parts of social studies loosely or closely related ? (ET, 45) E - Is the stability of classroom variables related to the type of structure of the classroom? (JER, 61) G - What does a program for academic achievement have to do with the economic improvement of a people? (PDK, 40)
11. CORRELATION - to know whether P and Q covary. Systematic, complementary association, change.	T - The question then arises as to whether the categories are independent or correlated. (JET, 2) E - What is the typical correlation between measures of motivation and educational achievement? (AERJ, 40) G - Do schools get better or worse as state and federal legislation increases? (PDK, 147)
12. CONDITIONALITY - to know whether (or in what way) P is a condition of Q. 2a. CONSEQUENCE - to know the consequent of P. Implication, conclusion, deduction; X as a result, outcome, inference, effect of P; P affects, influences, warrants, results in, leads to, operates on X. 2b. ANTECEDENCE - to know the antecedent of P. Influence, factor; P as function of X, due to, dependent on, susceptible to X, result of or from X; X produces, determines, brings about, facilitates, enhances, creates, contributes to, has impact on P.	T - What are the results of this disparity of themes? (ET, 129) E - What would happen to the resulting scores if examinees were given a multiple-choice test? (JER, 11) G - If class size could be reduced by one-third or one-fourth, would the teacher be able to provide a more individualized form of instruction? (PDK, 97) T - What are the conditions that give rise to the uncertain purpose and function of foundational studies? (ES, 39) E - Do college students evaluate their instructors and courses differently depending on their knowledge of the intended uses and disposition of the student ratings? (AERJ, 2) G - What are the determining factors that lead groups to work in one decision-making arena as opposed to others? (CH, 30)

Table 5b (cont.)

3. CAUSALITY (BI-CONDITIONAL) - to know whether P is the cause of Q and Q is the effect of P. (If P, then Q and if Q, then P.) Conjunction of conditionals with their converse; cause-effect relation just in case both conditions are true, when one is the case if and only if the other is the case.	T - Do the schools make the people or do the graduates with successful careers make the reputations for the schools? (ES, 41) E - Are there other possible physiological causes of mental disfunction? (AERJ,26) G - (none)
4. OTHER - to know P in other ways. (a) Deliberation - questions calling for decisions or actions (should, ought, will, do) or for testimony about wants, beliefs, preferences on the part of questioner and audience.	T - The question is, what are we going to do about it? (ET, 1) E - Is it possible and desirable to promote specific cognitive preference styles for specific careers? (JER, 48) G - What do we want our students to be after graduation from our elementary schools? (CH, 57)
(b) Extra - not specified in categories given.	T - What kinds of inquiry, then, would be appropriate with respect to the categories of prizing identified? (ET, 165a) E - (none) G - What do students say about reading instruction? (CH, 20)
(c) Partial - incomplete or uninterpretable questions.	T - Can we show the fly the way out of the fly bottle? (ES, 3) E - (none) G - What about the basics? (PDK, 258)

Table 5c

Logical Type of Questions

Logical Category	Journal Type			
	Theoretical (n=300)	Empirical (n=126)	General (n=498)	All Journals (N=924 qq.)
0. RHETORICAL	12.3%	1.6%	25.7%	18.1%
First-order: Properties				
1. AFFIRMATION-NEGATION	1.7	---	0.4	0.8
2. IDENTIFICATION	2.7	---	3.4	2.7
3. DESCRIPTION	5.3	17.5	10.4	9.7
4. DEFINITION	29.0	1.6	4.2	11.9
5. APPLICATION	18.7	18.3	23.7	21.3
6. EXPLICATION	6.7	8.7	8.2	7.8
All Properties	64.1	46.1	50.3	54.2
Second-order: Comparisons				
7. CONJUNCTION-DISJUNCTION	0.3	4.0	0.8	1.1
8. EQUIVALENCE	0.3	3.2	0.6	0.9
9. DIFFERENCE	1.7	5.6	2.6	2.7
All comparisons	2.3	12.8	4.0	4.7
Third-order: Relations				
10. RELATION	1.7	6.3	1.4	2.2
11. CORRELATION	1.0	2.4	0.4	0.9
12. CONDITIONALITY	5.0	28.6	10.0	10.9
13. CAUSALITY	0.3	1.6	---	0.3
All Relations	8.0	38.9	11.8	14.3
14. OTHER	13.3	0.8	8.0	8.8
	100%	100%	100%	100